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TC 1700

PATENT: 06076 USA

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3/12/03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLI-
CATION OF : Goldstein et al.
SERIAL NO. : 09/699,723 : GRP. ART UNIT: 1713
FILED : October 30, 2000 : EXAMINER: Reddick, Marie L.
FOR : REDUCED FORMALDEHYDE NONWOVEN BINDERS WHICH
CONTAIN POLYMERIZED UNITS OF N-METHYLOLACRYLAMIDE

Assistant Commissioner for Patents
Washington, D.C. 20231

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Sir:

APPEAL BRIEF UNDER 37 CFR 1.192(b)

This appeal is from the final rejection mailed on September 16, 2002.

REAL PARTY IN INTEREST

Air Products Polymers, L.P. is the real party in interest in the appeal. The assignment has been recorded at Reel/Frame 012762/0076.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

Claims 1-7 are pending and are being appealed. Claims 1-7 were rejected in a final office action mailed on September 16, 2002, and an advisory action mailed on October 22, 2002.

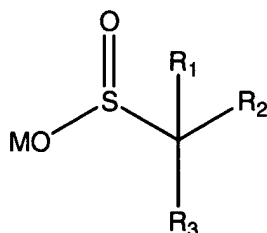
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STATUS OF AMENDMENTS

In a response under 37 CFR 1.116, mailed on October 1, 2002, an amendment was made to Claim 4 to correct a chemical name. In the advisory action, the examiner indicated that the amendment would be entered for purposes of Appeal.

SUMMARY OF INVENTION

The invention relates to use of a special class of reducing agents that is part of a redox catalyst system for the emulsion polymerization of vinyl acetate, N-methylolacrylamide (NMA), and, optionally, another monomer. The reducing agents have the formula



wherein M is a hydrogen atom, an ammonium atom or a monovalent metal ion, R₁ is OH or NR₄R₅ wherein R₄ and R₅ each are H or C₁-C₆ alkyl; R₂ is H or an alkyl, alkenyl, cycloalkyl or aryl and R₃ is CO₂M. The preferred reducing agent is the glycolic acid adduct of sodium sulfite which is sold under the trademark Bruggolite FF-6. (page 6, lines 16-18, of the specification) One of the unexpected benefits of using these reducing agents as part of the redox catalyst system is that the polymer emulsion has reduced free formaldehyde content. (page 3, lines 1-14; and page 5, line 22 to page 6, line 18, of the specification)

ISSUES

The issues presented in the final office action are as follows:

- 1) Objection to Claim 4 because of the following informalities: At line 6, of Claim 4, "and" should be inserted before "ethyl 2-hydroxy-2-sulfonato propionate-sodium salt".
- 2) Rejection of Claims 4 and 5 under 35 USC 112, second paragraph because:
 - A) The recited 2-hydroxy-2-sulfonato propionic acid was seen as being non-art recognized terminology.

B) The recited "catalytic system" per Claim 5 was seen as constituting indefinite subject matter as per the non-express establishment of proper antecedent basis.

3) Rejection of Claims 1-7 under 35 USC 103(a) as being unpatentable over Pinschmidt, Jr., et al.(US 4,360,632) or Weist et al. (US 4,044,197) in combination with Applicants' own disclosure; i.e., Applicants' disclosure that Bruggolite FF-6 is a known reducing agent.

GROUPING OF CLAIMS

Claims 1 through 7 are to be considered as a group.

ARGUMENT

1) Objection to Claim 4

The required amendment Claim 4 has been entered by the Examiner for purposes of appeal.

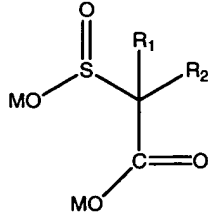
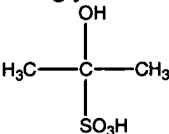
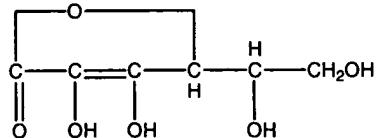
2) Rejection of Claims 4 and 5 under 35 USC 112, second paragraph

The required amendments have been entered by the Examiner for purposes of appeal.

3) Rejection of Claims 1-7 under 35 USC 103(a)

Claims 1-7 were rejected under 35 USC 103(a) as being unpatentable over Pinschmidt, Jr., et al.(US 4,360,632) or Weist et al. (US 4,044,197) in combination with Applicants' own disclosure; i.e., Applicants' disclosure that Bruggolite FF-6 is a known reducing agent. It was maintained by the Examiner, inter alia, that Pinschmidt, Jr. et al and Weist et al differ basically from the claimed invention as per the non-express recognition of the specifically depicted reducing agent; and the interchangeability of one well known reducing agent for another is a matter of ordinary choice to the skilled artisan. It was also maintained that Pinschmidt, Jr. et al. and Wiest et al were the closest prior art to the claimed invention. The undersigned disagrees with the Examiner's opinion regarding the closest prior art. It is believed that a careful review of Pinschmidt, Jr. et al, Wiest et al, and Mudge et al shows that Mudge et al is a closer reference than Pinschmidt, Jr. et al and Wiest et al.

Below is a table which summarizes the differences between the claimed invention and the three prior art references.

| Claims/Reference | Monomers forming Polymer Emulsion | Reducing Agent |
|-----------------------|--|--|
| Claimed invention | Vinyl acetate, N-methylol acrylamide (NMA), and optionally other monomers |  <p>where M is a hydrogen atom, an ammonium atom or a monovalent metal ion, R₁ is OH or NR₄R₅ wherein R₄ and R₅ each are H or C₁-C₆ alkyl; R₂ is H or an alkyl, alkenyl, cycloalkyl or aryl and the like.</p> |
| Pinschmidt, Jr. et al | Vinyl monomer; one monomer system is vinyl acetate, ethylene and <u>optionally</u> a functional monomer such as an ether of NMA. NMA itself is not listed as a possible monomer and is not in any of the examples. | ketone bisulfite; the ketone having 3-8 carbon atoms, such as acetone bisulfite and glyoxal bisulfite.  <p>acetone bisulfite</p> |
| Wiest et al | Ethylene; vinyl acetate; a monomer having an N-methylol group, such as NMA; an acryl compound; a mono-olefinically-unsaturated carboxylic acid; and a poly-olefinically-unsaturated monomer having a Tg of -40 to +10 °C | Examples of optional reducing agents (col. 5, lines 13-18): sodium formaldehyde sulfoxylate; iron-II salts; sodium dithionite; sodium hydrogen sulfite; sodium sulfite; and sodium thiosulfate. No reducing agent was used in examples 1-5; sodium formaldehyde-sulfoxylate was used in examples 6-9. |
| Mudge et al | Vinyl acetate, NMA, and optionally other monomers | ascorbic acid (structure below) and isomers thereof  |

Pinschmidt, Jr. et al teach a process for polymerizing a reaction mixture of vinyl monomer, stabilizer, oxidizing agent and reducing agent, wherein the reducing agent is a water-soluble ketone bisulfite. The reported value of the reducing agent is the fact that the reducing agent is free of formaldehyde yet permits control of the polymerization without

yellowing or odor problems (col. 2, lines 28-32). Representative vinyl monomers are listed at col. 2, lines 47-65 and vinyl acetate and ethylene are preferred. Examples of functional monomers that are optionally polymerized with vinyl acetate and ethylene are listed at lines 60-65 (col. 2) and include, for example, acrylic acid, glycidyl acrylate, crotonic acid, itaconic acid, maleic acid, and ethers of NMA such as N-n-butoxymethylacrylamide. NMA itself is not listed as an optional monomer nor is it or its ether used in the examples. It is agreed that Pinschmidt, Jr. et al discloses the use of ketone bisulfites. However, there is a significant difference between Applicants' claims and Pinschmidt, Jr. et al because a ketone bisulfite is not *prima facie* suggestive of the sulfinic acid derivatives having carboxyl (CO_2M) functionality as required by the claims on appeal. It is respectfully submitted that the ketone ($\text{C}=\text{O}$) is not equivalent nor suggestive of the CO_2M functionality. Although Pinschmidt Jr. et al discloses the production of formaldehyde free emulsions, there is no suggestion that the ketone bisulfite is more effective than other non formaldehyde reducing agents when emulsion polymerized in the presence of N-methylolacrylamide. Even if it were, it is respectfully submitted that it would have no bearing on the resolution under 35 U.S.C. §103(a), since there needs to be more of teaching of a chemical equivalence here to establish a *prima facie* case. It would not therefore have been obvious to combine the teachings of Pinschmidt, Jr. et al and Applicants' disclosure to obtain the claimed invention in which vinyl acetate is emulsion polymerized with NMA and optionally another monomer using a reducing agent as recited in Claim 1.

Wiest et al discloses vinyl acetate based polymers containing N-methylolacrylamide as the Examiner suggests. However, at col. 5, lines 5 to 18, examples of suitable polymerization catalysts include water-soluble free-radical-formers generally used in emulsion polymerization which can be used alone or together with a reducing agent such as sodium formaldehyde-sulfoxylate, iron II salts, sodium dithionite, and others. The reducing agent is not required and in fact is not used in Examples 1-5. Sodium formaldehyde-sulfoxylate is used in Examples 6-9. None of the possible reducing agents, including the reducing agent used in the examples, are suggestive of the reducing agent recited in Claims 1-7 of this invention. Applicants do not understand the basis for concluding this teaching is sufficient to establish a *prima facie* case of obviousness. It is submitted that it would not

have been obvious to combine the teachings of Wiest et al with Applicants' disclosure to obtain the claimed invention.

Mudge et al. teach use of a particular initiator system comprising a hydrophobic hydroperoxide and ascorbic acid (including isomers of ascorbic acid) in order to reduce the formaldehyde content in the preparation of an NMA crosslinked vinyl acetate-based emulsion polymer. Vinyl acetate can be copolymerized with at least one of any conventionally employed comonomer, such as ethylene, vinyl chloride, and vinyl esters of aliphatic carboxylic acids.

Based on the comparison discussed above and summarized in the table, it is submitted that Mudge et al. is a closer reference to the claimed invention compared to Pinschmidt, Jr. et al and Wiest et al. Mudge et al require the presence of a reducing agent (ascorbic acid or isomers of ascorbic acid such as isoascorbic acid) as part of a redox system in the emulsion polymerization reaction of vinyl acetate, NMA, and optionally another monomer. The use of the redox system is reported to result in polymer emulsions with lower levels of free formaldehyde compared to the same polymer emulsions prepared using other redox systems.

Data rebutting a prima facie obviousness rejection

In Example 2, page 8, line 20 to page 9, line 24, of the specification, Applicants compared the use of ascorbic acid to a representative compound of Claim 1 of this invention, i.e., the glycolic acid adduct of sodium sulfite sold under the trademark Bruggolite FF6, as a reducing agent for the emulsion polymerization of vinyl acetate, ethylene, and NMA. The results showed that Bruggolite FF6 was significantly more effective than ascorbic acid in reducing the free formaldehyde in the polymer emulsion. There is no teaching that would suggest such an unexpected and superior result. The other sulfites of the formula in Claim 1 are homologues or are related structurally to the Bruggolite FF-6 reducing agent. Absent a reference illustrating that homologues or structurally similar compounds would not offer similar results to the glycolic acid adduct of sodium sulfite, Applicants are entitled to the reasonable coverage afforded by the compositional structure in Claim 1. The results of

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Example 2 rebut a *prima facie* obviousness rejection based on the premise that reducing agents are interchangeable and a matter of ordinary choice for the skilled artisan.

Based on the above remarks, it is submitted that the claimed invention would not have been obvious based on the disclosure of Pinschmidt, Jr. et al or Wiest et al. in combination with Applicants' own disclosure and the rejection of Claims 1-7 under 35 USC 103(a) should be reversed.

Respectfully submitted,



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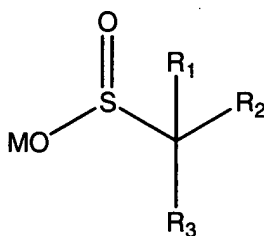


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APPENDIX
CLAIMS ON APPEAL

1. In a vinyl acetate based polymer emulsion formed by the emulsion polymerization of vinyl acetate and N-methylolacrylamide, optionally other monomers, in the presence of a stabilizing system and a redox catalyst system comprised of an oxidizing agent and a reducing agent, the improvement for reducing formaldehyde emissions in the resulting vinyl acetate based polymer emulsion, which comprises:

forming said vinyl acetate based polymer emulsion utilizing as the reducing component of the redox catalyst system a reducing agent of the formula:



where M is a hydrogen atom, an ammonium atom or a monovalent metal ion, R₁ is OH or NR₄R₅ wherein R₄ and R₅ each are H or C₁-C₆ alkyl; R₂ is H or an alkyl, alkenyl, cycloalkyl or aryl and R₃ is CO₂M.

2. The vinyl acetate based polymer emulsion of Claim 1 in which the vinyl acetate based polymer comprises ^{units of} ethylene in an amount of from about 10 to 40% by weight of the polymer.

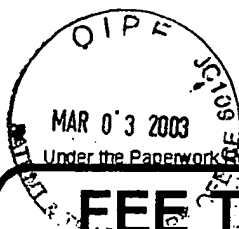
3. The vinyl acetate based polymer emulsion of Claim 2 wherein the N-methylolacrylamide is present in an amount of from about 0.5 to 10% by weight of the polymer.

4. The vinyl acetate based polymer emulsion of Claim 3 wherein the reducing agent represented by the formula is selected from the group consisting of: 2-hydroxyphenyl hydroxymethyl sulfinic acid-sodium salt; 4-methoxyphenyl hydroxymethyl sulfinic acid-sodium salt; 2-hydroxy-2-sulfinato acetic acid-disodium salt; 2-hydroxy-2-sulfinato acetic acid-zinc

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salt; 2-hydroxy-2-sulfinato propionate-disodium salt; ethyl 2-hydroxy-2-sulfinato propionate-sodium salt.

5. The vinyl acetate based polymer emulsion of Claim 4 wherein the vinyl acetate based polymer emulsion is formed using a redox catalyst system of hydrophobic hydroperoxide and the glycolic acid adduct of sodium sulfite.
6. The vinyl acetate based polymer emulsion of Claim 3 wherein M is sodium or zinc.
7. The vinyl acetate based polymer emulsion of Claim 3 wherein R₁ is OH.



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FEE TRANSMITTAL for FY 2003

Effective 01/01/2003: Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 320.00

Complete if Known

| | |
|----------------------|-------------------|
| Application Number | 09/699,723 |
| Filing Date | October 30, 2000 |
| First Named Inventor | Goldstein, et al. |
| Examiner Name | Reddick, Marie L. |
| Art Unit | 1713 |
| Attorney Docket No. | 06076 USA |

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account

Deposit
Account
Number
Deposit
Account
Name

01-0493

Air Products and Chemicals, Inc.

The Commissioner is authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☒ Credit any overpayments

☒ Charge any additional fee(s) during the pendency of this application

☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

| Large Entity Fee Code (\$) | Small Entity Fee Code (\$) | Fee Description | Fee Paid |
|-------------------------------|-------------------------------|------------------------|----------|
| 1001 750 | 2001 375 | Utility filing fee | |
| 1002 330 | 2002 165 | Design filing fee | |
| 1003 520 | 2003 260 | Plant filing fee | |
| 1004 750 | 2004 375 | Reissue filing fee | |
| 1005 160 | 2005 80 | Provisional filing fee | |

SUBTOTAL (1) (\$)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

| Total Claims | Extra Claims | Fee from below | Fee Paid |
|--------------------|--------------|----------------|----------|
| Independent Claims | -20** = | 18 | |
| Multiple Dependent | -3** = | 84 | |

| Large Entity Fee Code (\$) | Small Entity Fee Code (\$) | Fee Description |
|-------------------------------|-------------------------------|--|
| 1202 18 | 2202 9 | Claims in excess of 20 |
| 1201 84 | 2201 42 | Independent claims in excess of 3 |
| 1203 280 | 2203 140 | Multiple dependent claim, if not paid |
| 1204 84 | 2204 42 | ** Reissue independent claims over original patent |
| 1205 18 | 2205 9 | ** Reissue claims in excess of 20 and over original patent |

SUBTOTAL (2) (\$)

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FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Small Entity

| Fee Code (\$) | Fee Code (\$) | Fee Description | Fee Paid |
|---------------|---------------|--|----------|
| 1051 130 | 2051 65 | Surcharge - late filing fee or oath | |
| 1052 50 | 2052 25 | Surcharge - late provisional filing fee or cover sheet | |
| 1053 130 | 2053 65 | Non-English specification | |
| 1812 2,520 | 1812 2,520 | For filing a request for ex parte reexamination | |
| 1804 920 | 1804 920 | Requesting publication of SIR prior to Examiner action | |
| 1805 1,840 | 1805 1,840 | Requesting publication of SIR after Examiner action | |
| 1251 110 | 2251 55 | Extension for reply within first month | |
| 1252 410 | 2252 205 | Extension for reply within second month | |
| 1253 930 | 2253 465 | Extension for reply within third month | |
| 1254 1,450 | 2254 725 | Extension for reply within fourth month | |
| 1255 1,970 | 2255 985 | Extension for reply within fifth month | |
| 1401 320 | 2401 160 | Notice of Appeal | |
| 1402 320 | 2402 160 | Filing a brief in support of an appeal | 320 |
| 1403 280 | 2403 140 | Request for oral hearing | |
| 1451 1,510 | 1451 1,510 | Petition to institute a public use proceeding | |
| 1452 110 | 2452 55 | Petition to revive - unavoidable | |
| 1453 1,300 | 2453 650 | Petition to revive - unintentional | |
| 1501 1,300 | 2501 650 | Utility issue fee (or reissue) | |
| 1502 470 | 2502 235 | Design issue fee | |
| 1503 630 | 2503 315 | Plant issue fee | |
| 1460 130 | 1460 130 | Petitions to the Commissioner | |
| 1807 50 | 1807 50 | Processing fee under 37 CFR 1.17(q) | |
| 1806 180 | 1806 180 | Submission of Information Disclosure Stmt | |
| 8021 40 | 8021 40 | Recording each patent assignment per property (times number of properties) | |
| 1809 750 | 2809 375 | Filing a submission after final rejection (37 CFR 1.129(a)) | |
| 1810 750 | 2810 375 | For each additional invention to be examined (37 CFR 1.129(b)) | |
| 1801 750 | 2801 375 | Request for Continued Examination (RCE) | |
| 1802 900 | 1802 900 | Request for expedited examination of a design application | |

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) (\$) 320

SUBMITTED BY

(Complete if applicable)

| | | | | | |
|-------------------|-------------------|-----------------------------------|-------------|-----------|----------------|
| Name (Print/Type) | Mary E. Bongiorno | Registration No. (Attorney/Agent) | 36,091 | Telephone | (610) 481-8820 |
| Signature | Mary E. Bongiorno | Date | 26 Feb 2003 | | |

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